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ABSTRACT

The problem of public school education in today's environment is presented, and a case is made for restructuring public school organizations and/or management processes along the pattern of an open systems approach. The closed system of operating allows externalities to impact on it, and there is a continuing emphasis on reacting. With the benefit of modern technologies in communications, science, educational techniques, and data processing, the closed operational system can move to an open sociotechnical system that allows for more responsiveness to externalities and changes from a reactive to an active planning mode. (Author/MLF)

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Open Systems Approach - Can It Work For Public School Organizations?

A. E. Wolfe

Public school organizations are in a state of crisis; crisis being defined as a turning point, an emergency condition, or in a more medical context - a critical moment or stage of development of a dysfunction in the life or thought process. This latter reference to a life science phrase is important and not merely used by coincidence for it implies reference to a significant remedial suggestion. If the statement is true that public schools are in a state of crisis - and support will be presented to substantiate this observation - then a recommended solution to the problem may have roots in another life science-biology. The organizational structure and the human and personal elements comprising the organization may be either contributing to the root cause of the crisis or may not be capable of responding to correct the dysfunction as a result of structural constraints. In this paper I should like to present the problem of public school education in today's environment as I see it and to make a case for restructuring public school organizations and/or management processes along the pattern of an open systems approach.

Education in the United States is big business. Federal outlays alone for education of all types totalled $13.8 billion in 1974, an increase of $274 million over 1973. A record $96.7 billion for educating about 59 million students, making education the nations largest enterprise, the United States Office of

($117 Billion for 1975/76)

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Education has announced."Education will be the principal occupation of 30% of the population", said Commissioner John R. Otinna, "in fact education may now be considered the nation's largest enterprise in terms of people involved and the number of dollars expended". The U. S. Office of Education said the $96.7 billion amounts to 8% of the Gross National Product. Recent surveys of public reaction to expenditures for education indicate a significant counter reaction to the increasing flow of dollars to support public education. There is a reversal of the growth pattern in terms of physical structures, pupil population, and money to support this growth; there is a reversal from growth to contraction and regression. This shift of direction has had a sharp impact and administrators trained, developed and oriented to growth-oriented decisions are finding difficulty reversing direction and find they are unprepared by education or experience to cope. However, these are basically intelligent skillful educators and they are reacting in positive ways, but is the traditional organizational structure getting in the way? It may be timely to consider a fresh approach. Such a fresh and constructive change may exist in the open systems approach to organization and the systems approach to administration.

The term system, as used in this discussion, may need clarification. Usually one designates by system any aggregate of elements considered together with the relationships holding

among them. The term "system" is used here to denote a holistic system; in using this term, the elements are abstracted and reference is to the organization of the whole. In this context, the members of the system are, from the holistic viewpoint, not significantly connected with each other except with reference to the whole. What is expressed is that the whole is more than the sum of its parts; the system cannot be derived from the parts, the system is an independent framework in which the parts are placed. The greater the organization of the whole, the more the inherent properties of parts are utilized as co-determinants of positional values. The human organism, for example, is highly economical in this respect; it carries a minimal load of irrelevant properties of parts; most of the properties of parts are utilized, that is, are co-determinant of the positional value of the part. The possibility of the dynamic action of such a system would probably be rejected a priori by many administrators. Although causality is just as inexplicable as a system action, many administrators, because of their background and training, feel more comfortable with giving credit to the formulation of the dynamics of a given happening in terms of causality than to its formulation in terms of system action. Causal thinking has been used in education for a long time and rational thinking is so firmly rooted a habit that the transition to system thinking is at least as difficult as the transition from a three-dimensional

to a four-demensional geometry (Angyal, 1941)

Some peculiarities of open reaction systems are obvious. A closed system must according to the second law of thermo dynamics, eventually attain a time-independent equilibrium state, with maximum entropy and minimum free energy, where the ratio between its phases remains constant. An open system may attain a time-independent state where the system remains constant as a whole, and individual reactions concerned may be irreversible as well. A closed system in equilibrium does not need energy for its preservation, nor can energy be obtained from it. To perform work, however, the system must be, not in equilibrium, but tending to attain it. And to go on this way, the system must maintain a steady state. Therefore, the character of an open system is the necessary condition for the continuous working capacity of the organism (von BertalanfFy, 1950). This root development of open system theory as applied to physics and biology is fundemental to a clear understanding of the need for and merits of open systems theory as applied to organizational structures in general and educational organizational structures in particular.

Let us move from this theoretical decript of an open system to one that relates more to organizational structure and the motion of individuals within the organization. The first problem in understanding an organization or a social system is its location and identification. How do we know that we are dealing with an organization? The fact that people both within

and without an organization accept stereotypes about its nature and functioning is one determinant of its character. The second key characteristic of the common-sense approach to understanding an organization is to regard it simply as the epitome of the purposes of its designer, its leaders, or its key members. The teleology of this approach is both a help and a hindrance. The fallacy here is one of equating the purposes and goals of organizations with purposes and goals of individual members. From this point of view an organization is a social device for efficiently accomplishing through group means some stated purpose. However the two basic criteria for identifying social systems and determining their functions are (1) tracing the pattern of energy exchange or activity of people as it results in some output and (2) ascertaining how the output is translated into energy which reactivates the pattern. Living systems, whether biological organisms or social organizations, are acutely dependent upon their external environment and so must be conceived of as open systems. According to the second law of thermodynamics, a system moves toward equilibrium; it tends to run down, that is, its differentiated structures tend to move toward dissolution as the elements composing them become arranged in random disorder. The following nine characteristics seem to define all open systems:

1. importation of energy
2. through-put
3. output

4. systems as cycles of events
5. negative entropy
6. information input, negative feedback, and the coding process
7. the steady state and dynamic homeostasis
8. differentiation
9. equifinality

A major misconception is the failure to recognize fully that the organization is continually dependent upon inputs from the environment and that the inflow of materials and human energy is not a constant. One error stemming from this kind of misconception is the failure to recognize the equifinality of the open system, namely that there are more ways than one of producing a given outcome. A second error lies in the notion that irregularities in the functioning of a system due to environmental influences are error variances and should be treated accordingly. The open-system approach begins by identifying and mapping the repeated cycles of input, transformation, output and renewed input which comprise the organizational pattern (Katz and Kahn, 1966).

The work of von Bertalanfly mentioned earlier in this paper first fully disclosed the importance of the openness or closedness to the environment as a means of distinguishing living organisms from inanimate objects. In contradistinction to physical objects, any living entity survives by importing into itself certain types of material from its environment, transforming these in accordance

with its own system characteristics, and exporting other types back into the environment. By this process the organism obtains the additional energy that renders it negentropic; it becomes capable of attaining stability in a time-independent steady state - a necessary condition of adaptability to environmental variance. However in an organizational context an additional concept is needed - the causal texture of the environment. With this addition, we may now state that a comprehensive understanding of organizational behavior requires some knowledge of each member of the following set, where L indicates some potentially lawful connection, and the suffix 1 refers to the organization and suffix 2 to the environment:

$$L_{11}, L_{12}$$

$$L_{21}, L_{22}$$

L_{11} here refers to processes within the organization - the area of internal interdependencies; L_{12} and L_{21} to exchanges between the organization and its environment - the area of transactional interdependencies, from either direction; and L_{22} to processes through which parts of the environment become related to each other - the area of interdependencies that belong within the environment itself. There are four ideal types of causal texture described as follows:

- Placid, randomized environment

  there is no organizational distinction between tactics and strategy; while organizations under

these conditions can exist adaptively as single and indeed quite small units, this becomes progressively more difficult.

- Placid, clustered environment

  the new feature of organizational response to this kind of environment is the emergence of strategy as distinct from tactics.

- Disturbed - reactive environment

  if strategy is a matter of selecting the strategic objective - where one wishes to be at a future time - and tactics a matter of selecting an immediate action from one's available repertoire, then there appears in this environment an intermediate level of organizational response - that of the operation.

- Turbulent fields environment

  dynamic processes, which create significant variances for the component organizations, arise from the field itself.

What becomes precarious under turbulent fields environmental conditions is how organizational stability can be achieved. Turbulent fields demand some overall form of organization that is essentially different from the hierarchically structured forms to which we are accustomed. The perspective of the four environmental types is used to clarify the role of Theory X and Theory Y as representing a trend in value change. The establishment of a new set of values is a slow social process requiring

something like a generation - unless new means can be developed (Emery, Trist, 1965).

The relevance of these statements is that the environmental conditions existing today may be classified as falling within the fourth type, namely turbulent fields environment. The spiraling cost of education resulting from structural, organizational, and personnel growth in exponential terms, at a time when the national economy is experiencing a defined recession margining on an economic depression seems to describe dynamic processes which create significant variances for schools, arising from the environment itself. This impact is magnified when the source of financial revenues for public schools, the taxpayer, is similarly affected by the turbulent environment which is manifest in high rates of unemployment and a continual increase in the consumer price index, which measures the decreasing purchasing power of the family unit - inflation has a significant impact on the cost of operating public schools and a double impact on the financial resources of the public schools. At this same time, the social environment is hit with an additional variance, that is the political environment. There is a demand by the public for exposure of the decision making process of public school organizations which may be a reaction to the credibility gap existing with public elected officials, and the local school boards are the most visible and vulnerable to attack, whether that attack is justified or not. Organizational stability is not being maintained under these turbulent field

environmental conditions. The characteristic structure of school board members is changing; no longer are responsible, talented and busy volunteer school directors willing to take the punishment these variances create, not because of the lack of knowledge or experience to cope with the variance, but the time constraints are barriers to their continuing participation. The characteristics shift to less experienced, less busy types (housewives, parttime workers) and those with particular vested interests. Also the pressures are requiring the departure of skilled and knowledgeable educational administrators because of their unwillingness to face this whole new set of variances or because of their unwillingness to absorb unfair and unjustified public criticism, which does not imply that all of the current criticism is either unfair or unjustified. The lack of differentiation between the fair and unfair, the justified and unjustified criticism is in itself another source of variance building on and contributing to the turbulent environment conditions.

To this point, the consideration of the open system approach for public schools has focused on the macro aspect; the prevailing environmental conditions, the concept of organizational structure and managerial techniques. The emphasis will shift now to a more micro scheme and single public school entities will be considered; not any particular or specific public school organization but single unit structure in general. A project paper accompanies this term paper which concentrates

on a single specific school district for an evaluation of introducing a technological change in a socio-technical setting.

Formal organization is a system of consciously coordinated activities or forces of two or more persons (Barnard, 1938). As we inspect these formal Structures, we begin to see that they never succeed in conquering the non-rational dimensions of organizational behavior. The latter remain at once indispensable to the continued existence of the system of coordination and at the same time the source of friction, dilemma, doubt, and ruin. This fundamental paradox arises from the fact that rational action systems are inescapably imbedded in an institutional matrix, in two significant senses: (1) the action system - or the formal structure of delegation and control which is its organizational expression, is itself only an aspect of a concrete social structure made up of individuals who may interact as wholes, not simply in terms of their formal roles within the system; (2) the formal system, and the social structure within which it finds concrete existence, are alike subject to the pressure of an institutional environment to which some over-all adjustment must be made. On the one hand, any concrete organizational system is an economy; at the same time, it is an adaptive social structure. In formal organizations, the maintenance of the system as a generic need may be specified in terms of the following imperatives:

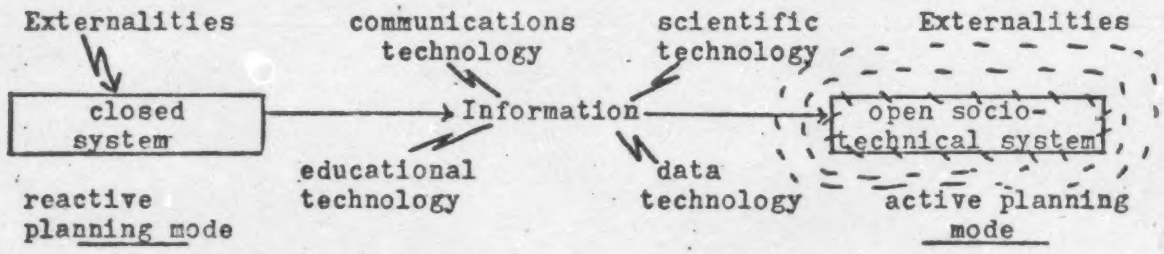
1. the security of the organization as a whole in relation to social forces in its environment.
2. the stability of the lines of authority and communication

3. the stability of informal relations within the organization
4. the continuity of policy and of the sources of its determination
5. a homogeneity of outlook with respect to the meaning and role of the organization (Selznick, 1948)

Given the importance of system analysis there remains the important question of whether an enterprise should be construed as a "closed" or an "open system", i. e. relatively closed or open with respect to its external environment. In the realm of social theory, there has been something of a tendency to continue thinking in terms of a closed system, that is, to regard the enterprise as sufficiently independent to allow most of its problems to be analysed with reference to its internal structure and without reference to its external environment. The alternative conception of open systems carries the logical implications that such systems may spontaneously reorganize towards states of greater heterogeneity and complexity and that they achieve a steady state at a level where they can still do work. They grow by processes of internal elaboration and manage to achieve a steady state while doing work; i. e. achieve a quasi-stationary equilibrium in which the enterprise as a whole remains constant, with a continuous throughput, despite a considerable range of external changes. In an organization there is no simple one-to-one relation between variations in inputs and outputs. Depending upon the technological system (education) different combinations of inputs may be handled to yield similar outputs and different product mixes may be produced from similar inputs.

As far as possible an enterprise will tend to do these things rather than make structural changes in its organization. The open system concept must be referred to the socio-technical system not simply to the social system of an enterprise. The primary task in managing the enterprise as a whole is to relate the total system to its environment and is not in internal regulation, per se. This does not mean that managers will not be involved in internal problems, but that such involvement will be oriented consciously or unconsciously to certain assumptions about the external relations of the enterprise. Considering enterprises as open socio-technical systems helps to provide a more realistic picture of how they are both influenced by and able to act back on their environment. If management is to control internal growth and development it must in the first instance control the boundary conditions - the forms of exchange between the enterprise and its environment (Emery, Trist, 1960).

The following paradigm may help to illustrate the progression and distinction of closed and open system:



In the closed system of operating a public school organization the enterprise allows externalities to impact on it and there is a continuing emphasis on reacting. Decisions are made on the basis of what has happened as a past event and energies are expended to correct dysfunctional situations in order to recapture or move toward a steady state. However, with the benefit of newer and modern technologies in communications, science, educational techniques, and data processing which have had rapid and significant effect on educational organizations, the closed operational system can move to an open socio-technical system which allows for more responsiveness to externalities and changes from a reactive planning mode to an active planning mode. The boundaries of the organization become limitless and the organization achieves a quasi-stationary equilibrium in which the enterprise as a whole remains constant, with a continuous through-put (the educational process) despite a considerable range of external changes.

Referring back to the original description of the problems impacting on public schools and the organizational and personnel dysfunctions existing at the present time, it would seem from the foregoing material that the public school organization is a prime candidate for the introduction of a newer, better and more resilient organizational management - the socio-technical open system approach. The public school is a local community segment of government which lives in the real world environment and benefits from and suffers with all of the national and local

externalities. It is an enterprise that is on-going and functional, it expands and contracts with the community in which it exists. The inputs to the organizational process are the valued assets of the community members - their children, and the outputs from the organization are these same cherished assets, hopefully developed through a careful learning process to persons with improved and improving value characteristics. The intermediaries within the organization acting on the through-put are the professional staff of skillful, highly trained teachers who are at the same time property owners in the community and thus taxpayers, and are also parents of children (inputs) to the system. The professional staff of teachers is only one subset of organizations within the larger organization. There is a cadre of administrators who as decision-makers within the organization are also taxpayers and thus a source of financial benefit and are also parents of children within the school system. Other subsets of the organization are secretaries, clerks, bus drivers, food services personnel, maintenance, custodial, etc. personnel. These individuals and subsets of the organizational structure are also simultaneously taxpayers and parents.

Public schools are real-world oriented organizations, not isolated from good and poor impacts of the normal commercial environment; they are dependent on local resources to be able to function financially and are governed by local community representatives; they have a valuable through-put, the children of the local area; they are staffed with employees who for the

most part are simultaneously sources of financial resources and parents of the children being educated -- what better opportunity exists to emphasize the usefulness of a social system of organizational operation that interfaces with the environment. Public schools are expensive to operate; they have all of the same product and personnel problems of industrial enterprises; they have additional external constraints and barriers to success, therefore they need to be managed with a new philosophy. A new philosophy of management which allows for more, not less, active participation of all subsets of the organization. There needs to be increased, not decreased, continuing dialogue to set objectives and goals for the organization. There can be a new and refreshing personnel relationship between the subsets of the organization which eliminates the hierarchy of class distinction which presently exists. The Board of School Directors is not the enemy of the professional staff; the professional staff is not in one social strata in the organization and all other employees are second class.

With a new philosophy of management and an acceptance throughout the organization of new goals and aims for the organization as well as a refreshing interchange of ideas and interation for decision-making, public schools can be better instruments for social order. Public schools can operate economically and efficiently without sacrificing the quality of

education. The change must come from and be supported by top management. There must be a sincere and continuing effort to involve all components of the organization in the full process of the organization.

The open systems approach can work for public school organizations. It only needs an opportunity for trial.